

Application Number **10/626,212**  
Amendment dated **10 November 2005**  
Reply to Office Action of **22 August 2005**

### Remarks

The claims have not been amended in this reply. Therefore, Claims 2, 4-6, 8-10, 12, 14, 15, and 17-19 remain pending in this application.

### Interview Summary.

Applicants thank the Examiner for conducting a personal interview in this Application on 14 September 2005. The following summarizes the substance of the interview, in accordance with the guidelines provided by MPEP 713.04.

- (A) No exhibits were shown, and no demonstration was conducted.
- (B) Claims 6, 9, and 10 were discussed.
- (C) The teachings of U.S. Patent 6,503,330 ("Sneh") was discussed.
- (D) The principal proposed amendments of a substantive nature are presented herein in the "Amendments to the Specification".
- (E) Applicants explained why the "greater than about 10 Å from the surface" element is supported by both the Application as filed, as well as the parent application, U.S. Patent Application 09/944,734 ("the '734 Application").
- (F) No other pertinent matters were discussed.
- (G) Applicants and Examiner agreed that the "greater than about 10 Å from the surface" element is supported by at least the disclosure of the '734 Application. Applicants and Examiner further agreed that any claims containing this element would be patentable over Sneh.

### Claim Rejections Under 35 U.S.C. § 112.

Claims 6, 9 and 10 stand rejected under 35 U.S.C. § 112, second paragraph, as lacking sufficient antecedent basis in the written specification to support the claim language "greater than about 10 Å from the surface". Applicants respectfully submit that this claim language is clearly supported by paragraph [0107] of the originally filed disclosure, which states in pertinent part:

In the case of remote plasma nitridation, the lower interface 262 comprises a nitridized portion of the substrate 200 preferably extending less than about 10 Å into the substrate

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200, more preferably comprising about 3 Å to 5 Å. Preferably the bulk substrate underneath this interface 262 contains less than about 1 atomic % nitrogen.

Applicants also respectfully submit that this claim language is clearly supported by originally-filed Claim 19 of parent U.S. Patent Application 09/944,734 ("the '734 Application") and by originally filed Claim 6 of the present Application, which recited:

6. The method of claim 1, wherein exposing incorporates less than 10 atomic % of the products of the plasma at a depth of greater than about 10 Å from the surface.

Based on the foregoing, Applicants believe that the "greater than about 10 Å from the surface" claim language is clearly supported by the specification and claims originally-filed in this Application. However, to expedite prosecution, Applicants have amended the specification to include new paragraph [0107.1], which also provides sufficient antecedent basis for Claims 6, 9 and 10. As noted above, the disclosure of new paragraph [0107.1] was disclosed in originally-filed Claim 19 of U.S. Patent Application 09/944,734 ("the '734 Application"), to which the present Application claims priority. The entire disclosure of the '734 Application was incorporated by reference into the present Application by virtue of the incorporation by reference statement included in the transmittal letter that was originally filed with the present Application.

Therefore, Applicants respectfully request that the rejections of Claims 6, 9 and 10 under 35 U.S.C. § 112, second paragraph, be withdrawn.

**Claim Rejections Under 35 U.S.C. § 102(e) based on U.S. Patent 6,503,330.**

Claims 12, 14, 15, and 17–19 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent 6,503,330 ("Sneh"). Claims 18 and 19 are independent; Claims 12, 14, 15 and 17 depend from independent Claim 19.

Sneh discloses a method of atomic layer deposition of Al<sub>2</sub>O<sub>3</sub> on a silicon substrate (6:47). The silicon substrate is first activated by forming thin layers of silicon oxide or silicon oxynitride, in which OH and/or NH<sub>x</sub> groups form the terminations (6:47–50). After the terminations are formed, the atomic layer deposition precursors are introduced to grow thin films of Al<sub>2</sub>O<sub>3</sub>.

In contrast to the disclosure of Sneh, Claims 18 and 19 both recite, among other things:

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exposing the surface to products of a plasma, thereby modifying termination of the semiconductive surface without depositing greater than one atomic monolayer of the products of the plasma on the surface [emphasis added]

Sneh does not teach this element. As described above, Sneh discloses that "thin layers" of silicon oxide or silicon oxynitride are formed during the pretreatment process. This certainly cannot anticipate the claimed methods, which involve "modifying termination of the semiconductive surface without depositing greater than one atomic monolayer of the products of the plasma" [emphasis added]. Therefore, Applicants respectfully submit that Claims 18 and 19 are allowable over Sneh, and request that the rejections of these claims be withdrawn. Furthermore, because Claims 12, 14, 15 and 17 depend from Claim 19, and further recite additional distinguishing features of particular utility, Applicants respectfully submit that Claims 12, 14, 15 and 17 are allowable over Sneh for at least the same reasons that Claim 19 is allowable over Sneh. Thus, Applicants request that the rejections of these claims be withdrawn as well.

**Claim Rejections Under 35 U.S.C. § 103(a) based on U.S. Patent 6,503,330.**

Claims 2, 4–6 and 8–10 stand rejected under 35 U.S.C. § 103(a) as being obvious in view of Sneh. Claims 6, 9 and 10 are independent; Claims 2, 4, 5 and 8 depend from independent Claim 6.

The Examiner had been interpreting the "greater than about 10 Å from the surface" claim language—which appears in each of independent Claims 6, 9 and 10—to mean that less than 1 atomic % of the plasma products penetrate to a depth less than 10 Å. As explained in the Office Action, this interpretation was motivated by the Examiner's perceived lack of antecedent basis for the "greater than about 10 Å from the surface" claim language. However, Applicants have addressed the Examiner's rejections under 35 U.S.C. § 112, second paragraph, above. Therefore, Applicants submit that the "greater than about 10 Å from the surface" claim language should be interpreted as written. Based on this interpretation, Applicants respectfully submit that Claims 6, 9 and 10 are patentable over Sneh.

The Examiner has acknowledged that Sneh is silent with respect to whether exposing incorporates less than 1 atomic percent of the products of the plasma at a

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specific depth from the semiconductor surface. However, the Examiner has taken the position that it would be obvious to recognize that a desired atomic percentage of the products of the plasma could be formed in a thin layer at a depth less than 10 Å from the semiconductor surface. The Examiner asserts that the motivation for modifying Sneh comes from Sneh's teaching that a thin, self-saturated layer is formed on the semiconductor surface during the plasma pretreatment.

Even assuming for the sake of argument that it would be obvious to modify Sneh as the Examiner suggests, Applicants submit that it would certainly not be obvious to modify Sneh to teach that exposing incorporates less than 1 atomic percent of the products of the plasma at a depth "greater than about 10 Å from the surface", as is recited in Claims 6, 9 and 10. Significantly, the Examiner's stated motivation expounded above is completely inapplicable to a claim element reciting a specific concentration of the products of the plasma at a depth greater than about 10 Å from the surface—that is, at a depth below the semiconductor surface.

Based on the foregoing, Applicants respectfully submit that Claims 6, 9 and 10 are allowable over Sneh, and request that the rejections of these claims be withdrawn. Furthermore, because Claims 2, 4, 5 and 8 depend from Claim 6, and further recite additional distinguishing features of particular utility, Applicants respectfully submit that Claims 2, 4, 5 and 8 are allowable over Sneh for at least the same reasons that Claim 6 is allowable over Sneh. Thus, Applicants request that the rejections of these claims be withdrawn as well.

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**Conclusion.**

In view of the foregoing amendments, the Applicants submit that this application is in condition for allowance, and respectfully request the same. If, however, some issue remains that the Examiner feels can be addressed by an Examiner's Amendment, the Examiner is cordially invited to call the undersigned for authorization.

Respectfully submitted,

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